



NASA STTR 2017 Phase I Solicitation

T6.03 Modeling And Estimation Of Integrated Human-Vehicle Design Influences

Lead Center: JSC

Participating Center(s): MSFC

Technology Area: TA6 Human Health, Life Support and Habitation Systems

The development of human space exploration vehicles and habitats requires an understanding of the relationships and interactions among the technical and human crew aspects of the system. This STTR subtopic seeks to enable creation of modeling and estimation capabilities that will inform system design decisions for enhancing mission success, crew task performance, and crew safety while reducing technical resource demands such as those on mission mass, power, volume and crew time. Currently there is no integrated framework in which to perform system design trades among various vehicle design capabilities taking into account the wide range of roles of the human crewmembers such as mission task performers, vehicle inhabitants, and even medical patients and caregivers. Life support inputs and outputs are accommodated in design considerations; however, this scope provides incomplete coverage of the human interactions with the system design. Just as vehicle and component life-cycle issues must be considered in system design, human adaption throughout a mission in areas such as individual and team behavioral health, physiological performance and clinical health must be folded in to inform vehicle and habitat system design decisions. Innovative approaches to modeling the mutual influences between the technical and human aspects of the exploration system are sought in to inform design trades and prioritization of system technology development. Methods are sought to systematically model and estimate impacts to the behavioral, physiological and clinical outcomes on crewmembers relative to vehicle design options, incorporating how the vehicle and humans will evolve and interact over the course of a mission. It is anticipated these methods will reveal attributes, or groups of attributes, of a system design as influential that would not otherwise be detected in the design phases of mission development. Model validation is not included in this topic call. Methods and demonstrations of application to informing system trade studies and technology development prioritization are included in the scope.